

CARBON STEEL, MILD STEEL & STRUCTURAL STEEL: FACTS

Carbon Steels :- All steels which have carbon in the range of 0.06 to 1 percent are termed as carbon steels.

For **general purpose** fabrication of vessels / pipes / flanges etc **at site** – pre-heat / post-heat cannot be easily organized. and also for **composite fabrication** like **SS lined** CS Flanges or **SS clad** CS vessels – Excess carbon results in Cr-C asymmetrical crystals – which leads to cracks in welding. Therefore, for such common applications, IS 2062, AISI 1025 etc with carbon < 0.25 percent – i.e. general purpose steel is used with Y.T.S<200MPa. For higher press. / temp. ASTM-A515 / A516 or IS 2002 boiler quality plates are used. The electrode used should be of 309 varieties

All Steel listed below are carbon steel since they are not Low Carbon steel (Carbon < 0.035%) The terms structural steel or commercial steel are colloquial. Unless specified otherwise, we shall use IS2062 with Chemistry checked.

- A. **AISI** (American Iron & Steel Institute) **C10XX**: identical to **SAE**.
Carbon Steels are identified by identicode C10XX. The last two digits represent the percent of Carbon in steel.
- B. **ASTM A105**: Standard for forged carbon steel & rolled bars. Commonly used for flanges fitting valves & long gauge bodies. YTS >250Mpa
- C. **ASTM 106** : Standard used for seamless carbon steel tubes.YTS >205Mpa
- D. **IS 2062** :- Structural / Carbon steel with carbon < 0.23 percent also called as Mild steel (**M.S.**) due to **lower carbon & ease of weldability**.YTS>250Mpa
- E. **ASTM 515 / 516 Gr.60-70**:-
These are boiler Quality carbon steel plates with carbon < 0.35 percent .
Generally used for manufacture of **high press. / temp.** boiler components.YTS >260Mpa (A516Gr70)
- F. **IS 2002**: boiler quality plate used for **high press. / temp.** application YTS >235Mpa

Comparison :- Chemical Properties.

Values indicated are max. percentage or range of elements present.

Grades	Elements (Max % if range not specified)					
	C	P	S	Mn	Si	CE
C1008	0.08	0.04	0.050	0.25-1.5	----	0.44
C1095	0.95	0.04	0.050	0.25-1.5	----	0.44
A105	0.35	0.05	0.045	0.60-1.05	0.35	0.44
A106	0.25	0.25	0.025	0.27-0.93	0.10	0.44
IS 2062	0.23	0.045	0.045	1.5	0.40	0.42
IS 2002-1	0.08	0.35	0.045	0.045	0.5-1.2	0.15-0.35

R K Dutt Policy : Unless otherwise specified , steel used for general purpose fabrication involving press. < 20 Bar, Temp. < 200°C, shall be IS 2062.

Generally carbon equivalent -**CE** should be < **0.44** percent, Yield strength –**YTS** should be **200Mpa**. Min. & hardness of parent metal to be <**22 Rc**.